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ABSTRACT

Previous research has found a relation between substance use and academic achievement and motivation, although the direction of the causal relation is unclear. Whereas numerous researchers have found that substance use is predictive of graduation from high school, others have found that poor academic achievement and low academic aspirations have a significant influence on substance use onset. In this study data from a 3-year longitudinal study of adolescent substance use were used to clarify the direction of influence between the adolescent's academic achievement and motivation and substance use. Adolescents (N=464), ages 12-16, from grades 6 through 11, and their parent(s) completed parallel questionnaires measuring marijuana, cigarette, and alcohol use; achievement motivation; and academic achievement. The results suggest that the relation between substance use and achievement and motivation is bidirectional. Adolescents with lower motivation tended to initiate the use of marijuana and initiation of cigarette use tended to decrease the adolescent's achievement and motivation. For 12-year-olds, only the path between substance use and academic achievement was significant. (ABL)

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ADOLESCENT SUBSTANCE USE AND ACADEMIC ACHIEVEMENT AND MOTIVATION

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Data from a three year longitudinal study of adolescent substance use were used to clarify the direction of influence between the adolescent's academic achievement and motivation and substance use. Four hundred and sixty-four adolescents and their parent(s) completed parallel questionnaires. The results suggest the relation between substance use and achievement and motivation is bidirectional. Adolescents with lower motivation tend to initiate the use of marijuana and initiation of cigarette use tends to decrease the adolescent's achievement and motivation. For 12 year-olds only, rate of substance use was related to future academic achievement.

Several researchers have found a relation between substance use and academic achievement and motivation (Bradley, 1982; Marston, et al., 1988; Hundleby, 1985; Hendin & Haas, 1985). However the direction of the causal relation is unclear. Whereas numerous researchers have found that substance use is predictive of graduation from high school (Newcomb & Bentler, 1986; Weng, Newcomb & Bentler, 1988; Galambos & Silbereisen, 1987), others have found that poor academic achievement (Brunswick & Messeri, 1984) and low academic aspirations (Engel, et al., 1987; Waldron & Lye, 1988) have a significant influence on substance use onset.

Data from a longitudinal study of adolescent substance use will seek to clarify the direction of

influence. The relations between cigarette, alcohol, and marijuana use and academic achievement and achievement motivation will be examined in this paper. The purpose of this study is to: (1) predict onset of use of cigarettes, alcohol, and marijuana from the adolescent's prior academic achievement and achievement motivation; (2) predict the academic achievement and achievement motivation of the adolescent following onset of cigarettes, alcohol and marijuana, controlling for levels of academic achievement and motivation prior to onset; and (3) using structural equation analysis, predict academic achievement and achievement motivation from rate of substance use, measured at an earlier point of time.

METHOD

Subjects & Procedure

Four hundred and sixty-four families with an adolescent participated in this study over three consecutive years. Parents and the adolescent completed parallel questionnaires under supervision of a trained monitor.

Characteristics of the Sample

Gender: 51.5% female

Age: Range 12 to 16 (mean age = 13.6; $sd = 1.4$)

Grade: Range 6 -11

54.5% from intact families

99.4% had at least 1 parent that graduated high school

42.8% had at least 1 parent with a college degree

Cigarette Use at T1 and T2: 320 (69%) nonusers; 50 (11%) initiated use between T1 and T2; 94 (20%) used at both T1 and T2.

Alcohol Use at T1 and T2: 164 (35%) nonusers; 67 (14%) initiated use between T1 and T2; 233 (50%) used at both T1 and T2.

Marijuana Use at T1 and T2: 314 (68%) nonusers; 45 (10%) initiated use between T1 and T2; 105 (23%) used at both T1 and T2.

Measures

Substance Use. Categorical variables (7 - point scale for cigarettes and marijuana; 8 - point scale for alcohol) were used to classify adolescents as initiators of each substance. Responses to these scales ranged from "I have never (smoked cigarettes, tried marijuana, tried an alcoholic beverage), not even once" to "I (smoke cigarettes, smoke marijuana, drink alcohol) at least once a day". For the purposes of this study, extent of use was ignored; and initiators were defined as those who had never used the substance at T1, but had used the substance at least once at T2 (or T3). Continued non-users were defined as those who had never used at T1 and T2 (and T3).

Monthly rates of cigarettes, alcohol, and marijuana were estimated using an algorithm which consisted of the weighted responses to items measuring weekly rate, monthly rate and rate over 6 months.

Achievement motivation. This construct was measured by two scales developed by Jessor and associates (Donovan & Jessor, 1983; Jessor, 1987; and Jessor, Chase and Donovan, 1980), adolescents value on achievement and achievement expectations. Both parents and the adolescent completed the value on achievement scale; only the adolescent completed the achievement expectations scale.

Table 1. Results of Logistic Regression: Predicting Onset of Marijuana Use at T2 and at T3 from Achievement Motivation Variables Measured at T1

	Variable	β	SE	Wald Test
T2	Value on Achievement	-.03	.25	.02
	Expectations of Achievement	-.89	.41	4.73*
	Value on Achievement (mother report)	-.24	.19	1.65
Model $\chi^2 = 10.61$ (3, $n = 283$), $p < .05$				
T3	Value on Achievement	.14	.21	.45
	Expectations of Achievement	-.03	.32	.01
	Value on Achievement (mother report)	-.42	.14	8.64**
Model $\chi^2 = 9.36$ (3, $n = 283$), $p < .05$				

* $p < .05$, ** $p < .01$

Table 2. Univariate Results of Multivariate Analysis of Covariance predicting Achievement and Motivation After Initiation of Cigarette Use

Variable	Never Used (n = 320)		Initiate Use (n = 50)		F
	M	SD	M	SD	
T3 Academic Achievement					
Parent Satisfied	3.32	.94	2.87	.99	9.93**
You Satisfied	3.10	.99	2.78	.98	4.96*
T3 Achievement Motivation					
Expectations of Achievement	2.45	.56	2.39	.64	3.31
Value on Achievement	3.97	.87	3.91	.90	.76
Value on Achievement (mother report)	3.61	1.03	3.14	1.22	7.85**

*p < .05, **p < .01

Academic Achievement. Academic achievement was measured by two items, "Were you satisfied with how well you did in school last term" and "Were your parents satisfied with how well you did in school last term".

RESULTS AND DISCUSSION

Predicting initiation of use from academic achievement and motivation variables. Logistic regression was used to investigate the influence of academic achievement and motivation (measured at T1) on the initiation of cigarettes,

alcohol and marijuana between T1 and T2 and between T1 and T3. Preliminary confirmatory factor analyses (see below) suggested that academic achievement and achievement motivation are separate constructs. Therefore, separate regressions were done with each set of variables. Interactions with age were examined and were not significant. Only the models in which the achievement motivation variables predicted initiation of marijuana use at both T2 and T3 were significant. The results of these regressions are given in Table 1. Adolescents who have

Table 3. Confirmatory Factor Analysis for 12 Year Olds and 13 to 16 Year Olds

	12 Year Olds		13-16 Year Olds	
	T1	T3	T1	T3
Substance Use				
Cigarette Rate	.686		.408	
Alcohol Rate	.790		.903	
Marijuana Rate	.707		.586	
Academic Achievement				
Parent Satisfied	.892	.945	.941	.942
You Satisfied	.713	.694	.604	.638
Achievement Motivation				
Expectations of Achievement	.765	.741	.718	.816
Value on Achievement	.773	.676	.603	.609
Value on Achievement (mother report)	.990	.819	.640	.787

Note: All paths are significant.

Table 4. Correlations Between Factors for 12 Year Old and 13 to 16 Year Old Age Groups

		T1		T3	
		Substance Use	Academic Achievement	Achievement Motivation	Academic Achievement
T1	Academic Achievement	-.17 (age 12) -.29 (age 13-16)			
	Achievement Motivation	-.21 -.55	.26* .42		
T3	Academic Achievement	-.30** .01	.29** .18	.08 .06	
	Achievement Motivation	.05 -.32	.15 .34	.50** .77	.35** .22

* $p < .05$, ** $p < .01$

lower achievement expectations and/or who have mothers who perceive them as having lower achievement motivation are more likely to initiate the use of marijuana.

Predicting academic achievement and motivation from initiation of use. Multivariate analysis of covariance was used to investigate the influence of initiation of cigarettes, alcohol, and marijuana between T1 and T2 on academic achievement and achievement motivation measured at T3 (controlling for these variables at T1). Only cigarette use significantly predicted academic achievement (Wilks' Lambda = .973, $F(2,365) = 5.06$, $p < .01$.) and achievement motivation (Wilks' Lambda = .975; $F(3,363) = 3.11$, $p < .05$) at T3. Results of the univariate analyses are given in Table 2. Adolescents who initiated cigarette use reported that they were less satisfied and perceived their parents as less satisfied with their academic performance following initiation of cigarette use than those adolescents who did not initiate use. Furthermore, as compared to the mothers of those adolescents who did not initiate cigarette use, mothers of adolescents who initiated use perceived their adolescent as having lower value on

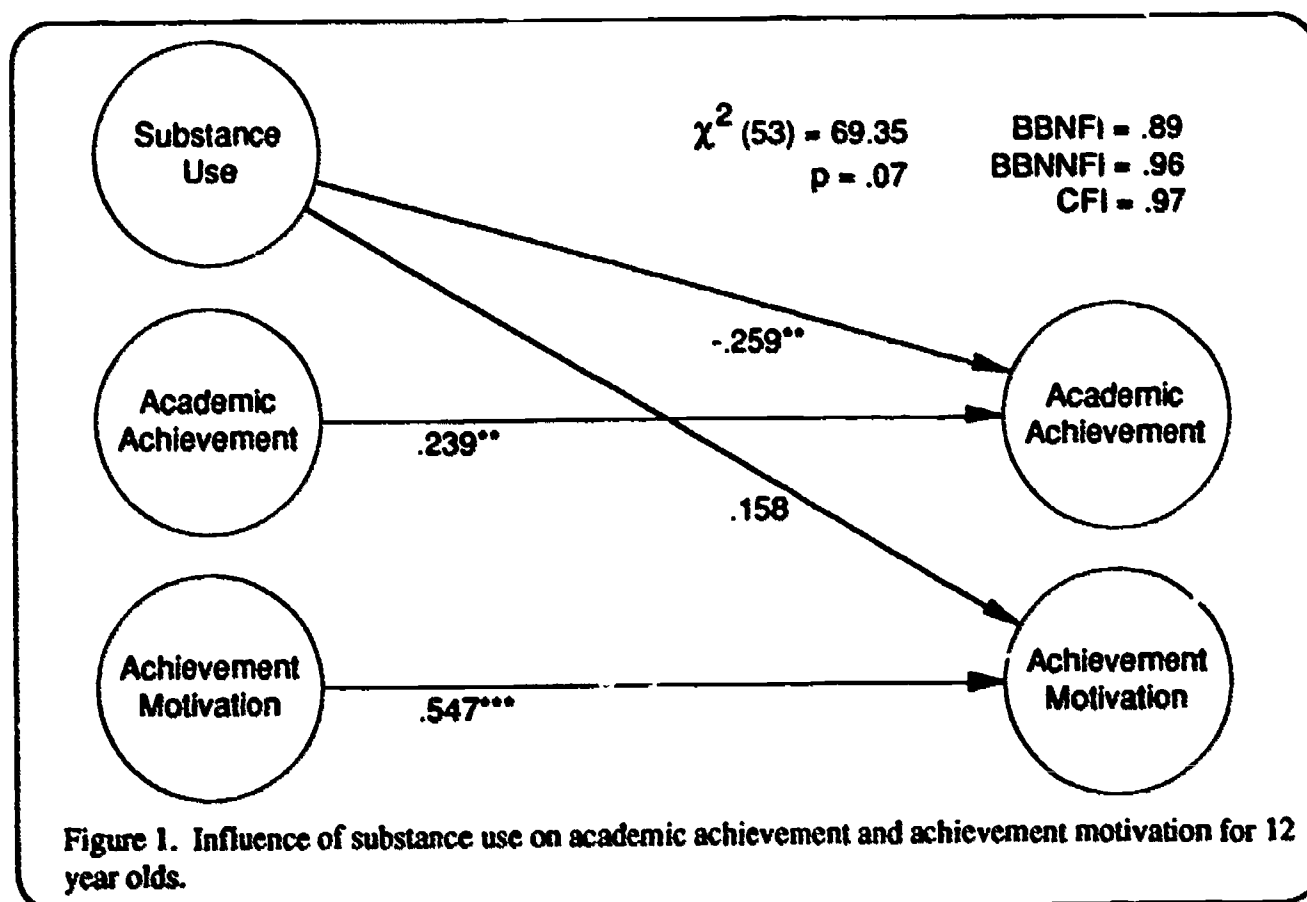
achievement following initiation of cigarettes.

Predicting substance use from academic achievement and motivation. Structural equation analysis using EQS was used to investigate the effect of level of substance use at T1 on achievement motivation and academic achievement at T3. Preliminary multiple sample analysis across age groups indicated that the factor loadings of variables from 12 year olds were different from those of older children. Therefore, separate analyses were conducted for these two age groups. The results of the confirmatory factor analyses including the loadings of individual variables on the factors and correlations between the factors for both 12-year olds and 13-16 year olds are given in Tables 3 and 4. A model in which the paths from substance use at T1 to academic achievement and achievement motivation (at T3) were estimated was compared to the null model, in which these paths were not estimated, for each age group. The fit of the first model, in which paths were estimated, was significantly better than the fit of the null model for the 12-year old sample. (χ^2 difference = 13.21, $df = 2$, $p < .01$). There was no difference between the fit of the model in which paths were estimated

and the fit of the null model for the sample of older adolescents. Figure 1 gives the structural paths for the relation between substance use and achievement and motivation for the 12-year olds. Only the path between substance use and academic achievement was significant. Those 12-year olds who used more substances at T1 had lower academic achievement at T3, when they were 14.

The results from this study suggest that the relation between substance use and both achievement and motivation is bidirectional and

is somewhat dependent upon the specific substance and the age group of the sample studied. Several theories have been proposed which could explain this bidirectional influence. One such theory is the general deviance hypothesis. This theory states that drug use, poor school performance and lack of motivation are manifestations of rejecting traditional values and are associated with more psychological tendencies towards problem behavior. This and other theories will be explored in future analyses.



$^{**}p < .01$, $^{***}p < .001$

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